

NON-PUBLIC?: N
ACCESSION #: 8804140127

LICENSEE EVENT REPORT (LER)

FACILITY NAME: LaSalle County Station Unit 2 PAGE: 1 of 5

DOCKET NUMBER: 05000374

TITLE: Reactor Scram on High Average Power Range Monitor Flux Level due to the Personnel Valving Error

EVENT DATE: 03/09/88 LER #: 88-003-00 REPORT DATE: 04/07/88

OPERATING MODE: 1 POWER LEVEL: 084

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Milton H. Richter, Asst. Technical Staff Supervisor

TELEPHONE #: 815-357-6761 Ext. 259

COMPONENT FAILURE DESCRIPTION:

CAUSE: A SYSTEM: BN REPORTABLE TO NPRDS: N

CAUSE: D REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: At 1732 hours on March 9, 1988, with Unit 2 in Operational Condition 1 (Run) at approximately 84% power, a valving error during an instrument surveillance caused the Reactor Recirculation (RR) pumps to trip off. This caused a large and rapid power reduction to approximately 40% power. While trying to stabilize the feedwater heaters and restart a RR pump, the Average Power Range Monitors (APRMs) were observed to be oscillating between 25-50% power (25% peak-to-peak). As preparations were being made to manually scram the reactor, an automatic scram occurred on APRM neutron flux high (118% trip) at 1739 hours. The scram was caused by neutron flux oscillations experienced while the unit was at a high rod line and low flow (natural circulation) condition.

The root cause of this event was personnel error for the initial transient, and procedural inadequacy for the scram. Although operating personnel were cognizant of the potential for (and observed) neutron flux oscillations, the operating procedures did not provide sufficient guidance for prevention/suppression of oscillations. The neutron flux oscillations

seen by the APRMs and Local Power Range Monitors were occurring "in phase" across the core and were bounded by the APRM high neutron flux scram (118%).

Operating procedures were revised to ensure prompt action (as recommended by General Electric SIL 380, Rev. 1) when the unit is operating at a condition which is susceptible to neutron flux oscillations. In addition, as a temporary measure, a Confirmatory Action Letter issued by NRC Region III requires the plant to be scrammed (manual) immediately in the event of a dual pump (RR) trip.

This event is reportable pursuant to the requirements of 10CFR50.73(a)(2)(iv) due to the automatic actuation of the Reactor Protection System.

(End of Abstract)

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PLANT AND SYSTEM IDENTIFICATION

General Electric - Boiling Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as (XX).

A. CONDITION PRIOR TO EVENT

Unit(s): 2 Event Date: 3/9/88 Event Time: 1739 hours

Reactor Mode(s): 1 Mode(s) Name: Run Power Level(s): 84%

B. DESCRIPTION OF EVENT

At 1739 hours on March 9, 1988, Unit 2 scrammed (automatic) on neutron flux high (118% trip) from the Average Power Range Monitors (APRMs, NR) (IG) due to neutron flux oscillations. The neutron flux oscillations occurred while the unit was at a low flow (natural circulation) and high rod line condition following the trip of the Reactor Recirculation (RR) (AD) pumps.

At 1732 hours, with Unit 2 in Operational Condition 1 (Run) at approximately 84% power (930 MWe), the Instrument Maintenance (IM) Department was performing a surveillance (functional test) on Differential Pressure Switch DPS-2B21-N037BB. This switch supplies a Reactor Core Isolation Cooling (RCIC, RI) (BN) initiation at reactor vessel level 2 (-50 inches). At this time, the "A" Turbine Driven Reactor Feedwater Pump and Motor Driven Reactor Feedwater Pump were

operating in three-element control, and feedwater level control (FW) (JK) was selected to channel "B" (which utilizes the same instrument reference leg as DPS-2B21-N037BB). In addition, there were two (2) Nuclear Station Operators (NSO's, licensed RO's) in the Unit 2 control room at this time.

Locally at DPS-2B21-N037BB, the IM technician had successfully isolated the switch (the variable and reference leg isolation valves were closed and the equalizing valve was open) in accordance with the surveillance procedure. While attempting to vent the switch prior to installation of the test equipment, the technician inadvertently opened the variable and reference leg isolation valves instead of the vent/test valves. This initiated a "pressure equalization" between the variable and reference legs, and resulted in a high "indicated" reactor water level to feedwater level control. The high "indicated" level to feedwater level control caused the feedwater pumps to begin slowly reducing flow. In addition, a high reactor water level alarm (level 7, +40.5 inches) was received in the control room which prompted one NSO to monitor feedwater level control.

A second IM technician, who was observing the surveillance locally, notified the primary technician of the valving error, and the variable and reference leg isolation valves were immediately closed (the valving error existed for approximately 15 seconds). The isolation of the reference leg from the variable leg resulted in a low "indicated" level spike. From level switches which utilize the same reference leg as DPS-2B21-N037BB, the level spike caused the following to occur;

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B. DESCRIPTION OF EVENT (CONTINUED)

- both RR pumps received an ATWS level 2 signal, causing the RR pumps to trip off (per design), and
- channel B-1 of the Reactor Protection System (RPS, RP) (JC) received a level 3 (+12.5 inches) signal for low reactor water level, causing a half scram condition.

The half scram signal was reset upon verification that "actual" reactor water level was not low.

Due to the large and rapid power reduction (following the trip of the RR pumps the unit was at approximately 40% power), feedwater heater high level alarms were received and heaters began isolating (steam side). While one NSO monitored feedwater level control, which was adequately handling the transient ("B" level control channel had

stabilized following the initial spike caused by the closure of the isolation valves), the attention of the second NSO was on re-establishing heaters (by opening the extraction steam valves) and preparing for the restart of the RR pumps (as directed by the operating procedure for loss of recirculation flow).

Approximately 5 minutes into the event, Local Power Range Monitor (LPRM, NR) (IG) downscale alarms began annunciating and the APRMs were observed to be oscillating between 25% and 50% power (25% peak-to-peak) with an approximate 2 second period. Cognizant of the unit's location on the power-to-flow map (region susceptible to neutron flux oscillations), operating personnel were attempting to start one RR pump to re-establish recirculation flow and restore stability. If the pump start attempt was unsuccessful, a manual scram of the reactor was planned. After positioning the "A" RR flow control valve for pump restart, two unsuccessful start attempts were made on the "A" RR pump. As shift personnel were preparing to manually scram the unit, an automatic scram occurred on APRM neutron flux high (118% trip) at 1739 hours.

This event is reportable pursuant to the requirements of 10CFR50.73(a)(2)(iv) due to the automatic actuation of the Reactor Protection System.

C. APPARENT CAUSE OF EVENT

The root cause of this event was personnel error for the initial transient, and procedural inadequacy for the scram.

The initiating transient (trip of the RR pumps) was caused by a valving error (by an IM technician) during the surveillance on DPS-2B21-N037BB. The low "indicated" level spike which occurred during correction of the valving error resulted in tripping the RR pumps and placing the unit in a natural circulation condition.

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C. APPARENT CAUSE OF EVENT (CONTINUED)

The scram was caused by neutron flux oscillations experienced while the unit was at a high rod line (high power) and low flow (natural circulation) condition. This condition (high rod line and low flow) has previously been identified by General Electric to be susceptible to neutron flux oscillations (core thermal hydraulic instabilities). The operating procedure for loss of recirculation flow (two pump trip) did not include the insertion of control rods (power rods) as an immediate corrective action. The insertion of power rods would have reduced rod

line which i

a recommended corrective action to prevent/suppress neutron flux oscillations. Operating personnel response for this event was found to be consistent with station procedures. The operating personnel were cognizant of the potential for (and observed) neutron flux oscillations, however, the operating procedures for this event did not provide sufficient guidance for prevention/suppression of oscillations.

The exact cause for the inability to start the "A" RR pump could not be determined, however, it is believed that a pump start permissive was not satisfied. The RR pump start circuitry contains numerous interlocks/permissives which need to be satisfied to achieve a successful pump start. Following the scram, the suspect permissive was no longer required for pump start, and a successful pump start occurred. At this time, the control room operator has no indication which verifies that the RR pump start permissives are satisfied.

D. SAFETY ANALYSIS OF EVENT

A review of this event determined that the neutron flux oscillations, seen by the APRM's and LPRM's, were occurring "in phase" across the core and were bounded by the APRM high neutron flux scram (118%) which automatically terminated the event. The frequency and magnitude of the oscillations experienced were consistent with the characteristics observed during stability testing and operation at other Boiling Water Reactors (BWR's). Previous analyses have demonstrated that the oscillations in neutron flux observed during this event do not result in exceeding fuel thermal and mechanical safety and design limits. Therefore, the neutron flux oscillations in this event did not adversely affect any safety system or the safe operation of the plant.

E. CORRECTIVE ACTIONS

This event was reviewed with General Electric and Commonwealth Edison's Nuclear Fuel Services Department.

The IM personnel involved in this event have been counseled.

This event has been reviewed with all IM Department personnel.

Operating Department personnel have reviewed this event through shift briefings.

E. CORRECTIVE ACTIONS (CONTINUED)

Operating procedures have been reviewed and revised to ensure prompt and proper action when the unit is operating at a condition which is susceptible to neutron flux oscillations. The procedure revisions incorporated the recommendations provided by General Electric in Service Information Letter (SIL) 380, Revision 1 (BWR Core Thermal Hydraulic Stability), with particular emphasis on the immediate insertion of control (power) rods upon the loss of a RR pump(s) at greater than the 80% flow control line.

In accordance with a Confirmatory Action Letter issued by the Nuclear Regulatory Commission (Region III), the unit will be manually scrammed upon the loss of both RR pumps. This is a temporary measure and is being controlled by an Operating Department special order (88-21).

During the startup of the unit, chemistry sampling (reactor water and off gas) occurred at an increased frequency to verify the integrity of the fuel. No indication of any fuel problems were found from this sampling.

Since the onset of neutron flux oscillations occurred in approximately five (5) minutes during this event, amendments to the station's Technical Specifications are being submitted which will require prompt initiation of corrective action when the unit is operating at a condition which is susceptible to neutron flux oscillations. Action Item Record (AIR) 374-200-88-01801 will track this item.

A discussion on this event, and the Operating procedure revisions which resulted from this event, will be presented to all licensed Operating personnel at the next scheduled Operator training session. AIR 374-200-88-01802 will track completion of this item.

A modification is being considered which would install a pump permissive indicating light for each RR pump. The light will provide indication for prompt assessment of the status of the pump permissives. AIR 374-200-88-01803 will track the completion of this item.

At this time, Commonwealth Edison's Production Training Department is investigating the ability to remodel the LaSalle simulator for this type of an event to enhance operator training. AIR 374-200-88-01804 will track this item.

F. PREVIOUS EVENTS

None.

G. COMPONENT FAILURE DATA

None.

ATTACHMENT # 1 TO ANO # 8804140127 PAGE: 1 of 1

Commonwealth Edison
LaSalle County Nuclear Station
Rural Route #1, Box 220
Marseilles, Illinois 61341
Telephone 815/357-6761

April 7, 1988

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Dear Sir:

Licensee Event Report #88-003-00, Docket #050-374 is being
submitted to your office in accordance with 10CFR50.73(a)(2)(iv).

/s/ for
G. J. Diederich
Station Manager
LaSalle County Station

GJD/MHR/kg
Enclosure
xc: Nuclear Licensing Administrator
NRC Resident Inspector
NRC Region III Administrator
INPO - Records Center

*** END OF DOCUMENT ***
